

MPM 2D Name: \_\_\_\_\_ Date: \_\_\_\_\_

## REALITY Check

Expand and simplify each expression.

$(x-3)(x+5)$	$2(4x-1)(x-3)$
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Change each expression into standard form.

$y = -(x+6)(x+2)$	$y = -3(x+1)^2$
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Apr 1-8:34 AM

MPM 2D Name: \_\_\_\_\_ Date: \_\_\_\_\_

## REALITY Check

Expand and simplify each expression.

$(x-3)(x+5)$ $x^2 + 5x - 3x - 15$ $x^2 + 2x - 15$	$2(4x-1)(x-3)$ $2(4x^2 - 12x - 2x + 3)$ $2(4x^2 - 14x + 3)$ $8x^2 - 28x + 6$
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Change each expression into standard form.

$y = -(x+6)(x+2)$ $y = -(x^2 + 2x + 6x + 12)$ $y = -(x^2 + 8x + 12)$ $y = -x^2 - 8x - 12$	$y = -3(x+1)^2$ $y = -3(x+1)(x+1)$ $y = -3(x^2 + x + x + 1)$ $y = -3(x^2 + 2x + 1)$ $y = -3x^2 - 6x - 3$
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Apr 1-8:34 AM

### (3.5) Quadratic Models Using Factored Form

- Quadratic Regression, using the TI83 and by hand
- Determine the equation, in standard form, using technology

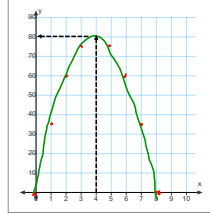
Regression analysis is used to determine a model for data in a scatter plot. We are going to determine the equation of parabolas by hand and using the TIInspires.

First we plot some data and perform a quadratic regression to determine the equation of the curve of best fit.

Apr 4-7:58 PM

**Example 1:** The table below gives the height of a golf ball over time.

Time (seconds)	Height (m)
0	0
1	35
2	60
3	75
4	80
5	75
6	60
7	35
8	0



a) Create a scatter plot of the data and draw a curve of best fit on the grid below

b) Determine an algebraic model for the data, in factored form and in standard form.

$$y = a(x-r)(x-s)$$

$$y = a(x-0)(x-8)$$

$$80 = a(4-0)(4-8)$$

$$80 = a(4)(-4)$$

$$80 = a(-16)$$

$$-16a = 80$$

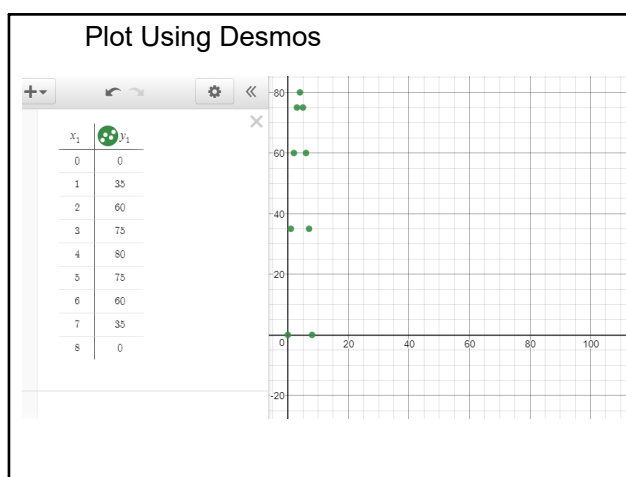
$$a = -5$$

$$y = -5(x-0)(x-8)$$

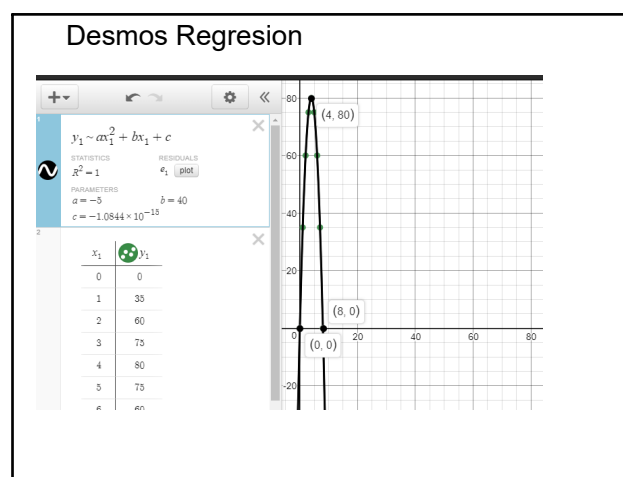
$$y = -5(x^2 - 8x)$$

$$y = -5x^2 + 40x$$

Apr 4-8:01 PM



Apr 4-10:26 AM



Apr 4-10:28 AM

Now, we will repeat the same exercise with the TI83+ and compare our two equations.

- Press STAT Choose: 1: Edit Lists
- Enter the data from above into the numbered lists.  
Scroll down after each entry
- Press 2nd y= (Stat Plot)
- Select 1. Turn Scatterplot ON
- Press Graph
- To perform a regression on the data in the Scatterplot,  
Press Stat, Calc(Scroll over)  
Choose 5: QuadReg.  
Enter 2nd 1, 2nd 2, Vars Y-Vars(Scroll Over) 1 and 1  
Copy down values for a and c  
The equation of the curve of best fit is:

$$a = -5 \quad b = +40 \quad c = 0$$

$$y = -5x^2 + 40x$$

### Challenge

The data in the table shows the height of a model rocket over time.

- On a piece of graph paper, make a scatter plot of the data and draw a curve of best fit.
- Without using the TI83, estimate the coordinates of the zeros and the vertex and find an equation that models the data, in standard form.
- Now, using the TI83 and many of your graphing calculator skills, determine a model (equation) for the height of the rocket over time, **in standard form** and compare it to your equation in b).
- Compare the two equations. Which equation best models the data? Explain.

Time (s)	Height (m)
0.0	1.500
0.4	12.276
0.9	23.541
2.4	42.636
3.7	41.349
4.2	36.444
5.1	21.441
5.8	4.284

Apr 4-8:08 PM

Apr 4-8:12 PM

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$$y \sim -4.9x^2 + 23.9x + 1.5$$

$$R^2 = 1.0 - 100\% \text{ goodness of fit}$$

Factored

$$y = -4.9(x + 0.051)(x - 5.749)$$

Apr 4-8:12 PM

### Homework

Pg. 175 # 1, 2, 4, 6, 8, 9, 13

Alternate

P 176 q. 5,6

Apr 1-8:33 AM

Apr 2-10:19 AM